

UNITED STATES DEPARTMENT OF COMMERCE
Environmental Science Services Administration
Weather Bureau Pacific Region
Honolulu, Hawaii

A METEOROLOGICAL GLOSSARY
of
Terms Used by Forecasters in Hawaii

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FOREWORD

Every day Weather Bureau forecasters talk with farmers, contractors, housewives, yachtsmen, and others, either face-to-face and by telephone, or indirectly, through newspapers, TV and radio. In spite of conscientious efforts to phrase forecasts in terms understandable to the layman, a communications gap persists.

It sometimes seems impossible to avoid using technical terms to explain the causes and effects of the weather. And even commonly used non-technical terms such as "fair" or "partly cloudy" have different meanings to different people. Such words, however, do have precise meanings which are universally understood by weathermen.

The Weather Bureau Forecast Center at Honolulu disseminates dozens of forecasts and weather bulletins each day. Some are intended for use by the general public; others are prepared to meet requirements of agriculture, aviation, marine, fishing and other specialized user groups.

Some of the terms included in this Glossary are not -- or should not be -- used in communication with the general public. These terms are included for the benefit of the specialized user groups who require more comprehensive background material on weather developments than is included in radio broadcasts to the public.

All inclusive meteorological glossaries fill hundreds of pages. This Glossary contains only the words and phrases frequently used by forecasters in communication with the people of Hawaii.

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METEOROLOGICAL GLOSSARY

(Terms frequently used by forecasters in guidance material and on radio broadcasts)

Advection - The horizontal movement of air masses or weather conditions.

Air Mass - A large body of air having approximately the same temperature and moisture characteristics throughout its horizontal extent.

Anticyclone - A high pressure area; generally referred to as a "high".

Anticyclonic circulation - The clockwise movement of air around a high pressure center. (Counterclockwise in the Southern Hemisphere.)

Atmosphere - The air surrounding the earth.

Atmospheric pressure - The weight of the atmosphere, in force per unit area.

Backing - A counterclockwise change in wind direction: for instance, from southeast to east to northeast.

Blocking - The obstructing (usually by a large nearly stationary high) of the normal west to east migration of cyclones and anticyclones.

Building - Intensification of high pressure systems. (Applied to a ridge or high pressure center).

Central pressure - The atmospheric pressure at the center of a high or low: the highest pressure of a high; the lowest pressure of a low.

Circulation - In the broadest sense, an organized movement of air. (See Anticyclonic Circulation and Cyclonic Circulation).

Climate - The long-term manifestations of the weather, as opposed to day-to-day or season-to-season changes.

Cloud classification - Classification of clouds according to type (e.g., cumulus, altocumulus, cirrus, etc.) or altitude (e.g., high, middle, low). High clouds include the cirriform types; middle clouds, the altostratus and altocumulus; and low clouds, the cumulus, stratus and stratocumulus.

Cloud cover - That fraction of the sky covered by clouds. Clear refers to from 0 to .2 coverage; partly cloudy from .3 to .7; cloudy more than .7. Additionally, overcast means completely covered; scattered from .1 to .5; and broken, from .6 to .9.

Col - The point or region of relative lowest pressure between two highs or of highest pressure between two lows.

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Cloud cover - The fraction of the sky covered by clouds. Clear refers to from 0 to 4 covered; partly cloudy from 5 to 7; cloudy more than 7. Additionally, overcast means completely covered; scattered from 1 to 3; and broken from 4 to 6.

Col - The point in region of relative lowest pressure between two highs or of highest pressure between two lows.

Convection - Atmospheric motions that are predominantly vertical as distinguished from advection: generally caused by heating of air near surface.

Convective activity - Convection, especially as manifested by the development of cumulus clouds and resulting weather conditions ranging from showers to severe thunderstorms.

Cooperative observer - An unpaid observer who takes weather observations for the Weather Bureau.

Cut-off low - A low pressure system which has been displaced out of the basic westerly current and lies to the south of this current.

Cyclone - A low pressure area; generally referred to as a "low". Most cyclones are not accompanied by violent storms. Tornadoes, hurricanes, and typhoons are intense "lows" or cyclones.

Cyclonic circulation - The counterclockwise movement of air around a low pressure center. (Clockwise in the Southern Hemisphere).

Deepening - A decrease in the central pressure of a cyclone. Deepening is usually accompanied by an intensification of the cyclonic circulation, an increase in wind speeds, and worsening weather.

Depression - An area of low pressure.

Disturbance - Any migratory region of low pressure, but usually one relatively small in size and effect.

Dry air - Air with low relative humidity.

Easterlies - Any winds with components from the east, but usually applied to broad currents of persistent easterly winds. The tropical easterlies, sometimes referred to as the trades, dominate the area surrounding the Hawaiian Islands.

Easterly wave - A wave-like disturbance moving from east to west within the tropical easterlies and characterized by a trough of low pressure and slight wind shift. Weather east of the trough line is cloudier and more showery than to the west. Easterly waves occasionally intensify into tropical cyclones.

Eye (of hurricane, storm) - A roughly circular area of comparatively light winds and fair weather found at the center of a severe tropical storm. Eye diameters range from a few miles to more than forty miles.

Extratropical cyclone - A cyclonic storm that is not of tropical origin. The term usually refers to lows of middle and higher latitudes.



Fair - When used in weather forecasts this term implies the absence of precipitation; less than .4 sky cover of low clouds, and no other extreme conditions of cloudiness, visibility, or wind.

Filling - An increase in the central pressure of a cyclone. Filling is usually accompanied by a weakening of the cyclonic circulation, a decrease in wind speeds, and improving weather.

Flow - Refers to the broadscale movement of air or the circulation over a given area.

Freezing level - The lowest altitude in the atmosphere over a given location at which the air temperature is 0°C (32°F). In Hawaii the freezing level is usually between 10,000 and 15,000 feet above sea-level.

Front - The transition zone between air masses. A front almost invariably separates air masses of different temperature. Features which may indicate a front include a pressure trough; a change in wind direction; a moisture discontinuity; and certain characteristic cloud and precipitation forms.

Gradient - The rate of decrease of a meteorological element (e.g., temperature or pressure) as measured in the direction in which the decrease is greatest.

Gust - A sudden brief increase in the speed of the wind.

Height falls (rises) - Changes in the height of constant pressure surfaces: equivalent to falling or rising pressure at that height.

High - An area of relatively high atmospheric pressure surrounded by lower pressure. An anticyclone. }

Hurricane - A severe tropical cyclone with maximum winds 73 mph (64 knots) or higher. A typhoon. (See Tropical Cyclone).

Hurricane warning - A warning of an impending hurricane.

Hurricane watch - An announcement that hurricane conditions pose a threat to a specific area. Residents are advised to take preparedness measures, but otherwise to continue their normal activities.

Hurricane wave (surge) - A sudden rise, associated with a hurricane, in the level of the sea along shorelines.

Instability - A vertical distribution of temperature such that an air parcel given either an upward or downward impulse will move away with increasing speed from its original level. Instability generally results in increased vertical development of clouds which, in turn, causes increases in shower activity. (See Stability).

Clear - When used in weather forecasts this term implies the absence of precipitation; less than a sky cover of low clouds, and no other extreme conditions of cloudiness, visibility, or wind.

High - An increase in the central pressure of a cyclone. Falling is usually accompanied by a weakening of the cyclonic circulation, a decrease in wind speeds, and improving weather.

Low - Refers to the barometric movement of air or the circulation over a given area.

Freezing level - The lowest altitude in the atmosphere over a given location at which the air temperature is 0°C (32°F). In Hawaii the freezing level is usually between 10,000 and 15,000 feet above sea level.

Front - The transition zone between air masses. A front almost invariably separates air masses of different temperatures. Features which may indicate a front include a pressure trough, a change in wind direction, a moisture discontinuity, and certain characteristic cloud and precipitation forms.

Gradient - The rate of decrease of a meteorological element (e.g., temperature or pressure) as measured in the direction in which the decrease is greatest.

Gust - A sudden brief increase in the speed of the wind.

Height falls (rises) - Changes in the height of constant pressure surfaces; equivalent to falling or rising pressure at fixed height.

High - An area of relatively high atmospheric pressure surrounded by lower pressure. An anticyclone.

Hurricane - A severe tropical cyclone with maximum winds 75 mph (64 knots) or higher. A typhoon. (See Tropical Cyclone).

Hurricane warning - A warning of an impending hurricane.

Hurricane watch - An announcement that hurricane conditions pose a threat to a specific area. Residents are advised to take precautionary measures, but otherwise to continue their normal activities.

Hurricane wave (surge) - A sudden rise, associated with a hurricane, in the level of the sea along shorelines.

Instability - A vertical distribution of temperature such that an air parcel given either an upward or downward impulse will move away with increasing speed from its original level. Instability generally results in increased vertical development of clouds which, in turn, causes increases in shower activity. (See Bufoing).

Intertropical convergence zone - The boundary area between trade wind systems of the Northern and Southern Hemisphere; an elongated band of disturbed weather, usually broken rather than continuous. In the Pacific Ocean area it is generally found north of the equator in all seasons.

Inversion - A layer in the atmosphere in which temperature increases with altitude.

Isobar - On a weather map, a line connecting points of equal pressure.

Jet stream - A meandering and relatively narrow belt of strong winds (speeds 50 knots or more) embedded in the normal wind flow aloft; generally found at high altitudes.

Kona storm - A migratory low found at the surface and/or aloft, and accompanied by widespread heavy rain and southerly winds.

Kona weather - Warm humid weather associated with the absence of the trades, very light winds, and the stagnation of air over the Islands.

Kona wind - A wind from the south or southwest.

Land breeze - A coastal breeze blowing from land to sea. It usually occurs at night and alternates with a sea breeze which blows in the opposite direction during the day. (See also Sea Breeze).

Lapse rate - The rate of change of air temperature with altitude. Normally about 2°C per thousand feet in Hawaii.

Low - An area of relatively low atmospheric pressure surrounded by higher pressure. A cyclone or depression.

Low aloft (upper level low, etc.) - A cyclonic circulation in the upper atmosphere and not associated with a low near sea level.

Pacific high - The semi-permanent subtropical high, centered normally at 30° - 40°N and 140 - 150°W.

Pilot balloon (PIBAL) - A small balloon which indicates wind speed and direction aloft by its drift as observed from the ground.

Polar front - The frontal zone between air masses of polar and those of tropical origin.

Prevailing wind - The wind direction most frequently observed.

Probability forecast - A forecast of the probability (usually in percent) that a given weather event (usually precipitation) will occur, as distinguished from a categorical forecast.

Radiosonde (RAOB) - A device carried aloft by a balloon and which measures and automatically transmits to a ground recorder the temperature, pressure, and humidity of the air through which it ascends.

Rain intensity classification - Rain, either steady or showery, is classified by its rate of fall. Light, trace to .10 inch per hour; moderate, .11 to .30 inch per hour; and heavy, over .30 inch per hour.

Rawinsonde (RAWIN) - A radiosonde, tracked by radar, to provide wind speed and direction, as well as temperature, pressure, and humidity aloft.

Ridge - An elongated area of relatively high pressure.

Retrograde - The movement of an atmospheric wave or pressure system in a direction opposite to that of the basic flow in which it is embedded.

Saturated air - Air that includes the maximum amount of water vapor that can exist at a given temperature and pressure. The relative humidity of saturated air is 100%.

Sea breeze - A coastal breeze blowing from sea to land. It usually occurs during the day and alternates with a land breeze, which blows in the opposite direction at night.

Shear line - A narrow zone across which there is an abrupt change in the speed and/or direction of the wind.

Shower - Precipitation from a convective cloud. Showers are characterized by the suddenness with which they start and stop and by rapid changes in intensity.

Small-craft warning - A warning, intended chiefly for small boat operators, of impending winds up to 32 mph (28 knots).

Sounding (upper air) - An observation of temperature, humidity, pressure, wind, etc., made through a vertical column of the atmosphere.

Sprinkle - A popular term for a very light rain shower.

Squall - 1. A strong wind characterized by sudden onset, short duration (usually several minutes) and a rather sudden decrease.

2. A severe local storm considered as a whole; that is, wind, cloud mass and (if any) precipitation, thunder and lightning.

Stability - A vertical distribution of temperature such that an air parcel given either an upward or downward impulse will tend to return to its original level. Stability generally resists the vertical development of clouds.



Subsidence - A descending or "settling" motion of air, usually over a wide area. Subsiding air is generally stable.

Surface pressure - The pressure exerted by the atmosphere at a given location on the earth's surface. (See Atmospheric Pressure).

Surge (in trades) - A sudden increase in the strength of the trade winds.

Synoptic - Refers to the overall condition of the atmosphere at a given time.

Trace - An insignificantly small, or unmeasurable, quantity of rainfall; less than .005 inches.

Trades (trade winds) - The prevailing winds in Hawaii are east-northeasterly trades. The trade system, which covers most of the tropics, begins as north - northeast winds at about latitude 30° in January and latitude 35° in July, gradually turning to northeast and east - northeast as they approach the equator. The trades are the most persistent wind system on earth.

Trade-wind cumulus - The characteristic cloud of the trade winds during undisturbed weather conditions.

Trade-wind inversion - A temperature inversion usually present during trade-wind conditions. Air below the inversion is relatively moist and cool, and air above the inversion relatively warm and dry. Average height of the inversion over Hawaii is about 6,000 to 7,000 feet above sea-level.

Trade-wind showers - Showers from cumulus clouds within the trade wind flow.

Tropical cyclones - The general term for a cyclone, or low, that originates over the tropical oceans. By international agreement tropical cyclones are classified according to their intensity as follows: tropical depression, winds less than 34 knots (39 mph); tropical storm, winds of 34 through 63 knots (39 through 73 mph); hurricane or typhoon, winds 64 knots (74 mph) and higher.

Tropopause - The boundary between the troposphere and the stratosphere, usually characterized by an abrupt decrease in lapse rate.

Troposphere - The portion of the atmosphere between the earth's surface and the tropopause, and in which virtually all weather occurs.

Trough - An elongated area of low pressure.

Typhoon - A hurricane occurring west of the International Date Line (180° longitude). (See Hurricane).

Upper-air disturbance - A disturbance of the flow pattern in the upper air; a low or trough which is more strongly developed aloft than near the ground.

Veering - A clockwise change in wind direction: for instance, from southwest to west to northwest.

Waterspout - A tornado occurring over water; rarely, a lesser whirlwind over water comparable in intensity to a dust devil over land.

Wind classification (trades) -

| | | |
|-----------|--------------|------------------|
| Gentle | 8 to 12 mph | (7 to 10 knots) |
| Moderate | 13 to 18 mph | (11 to 16 knots) |
| Fresh | 19 to 24 mph | (17 to 21 knots) |
| Strong | 25 to 31 mph | (22 to 27 knots) |
| Near Gale | 32 to 38 mph | (28 to 33 knots) |

Wind warnings -

| | | |
|------------|------------------------------|------------------|
| Gale | 39 to 54 mph | (34 to 47 knots) |
| Whole Gale | 55 to 73 mph | (48 to 63 knots) |
| Hurricane | 74 mph (64 knots) and higher | |

Veering - A noticeable change in wind direction: for instance, from south-west to east to north-west.

Whirlwind - A tornado occurring over water; rarely, a lesser whirlwind over water comparable in intensity to a dust devil over land.

Wind classification (Fahrenheit) -

| | | |
|-----------|--------------|------------------|
| Gentle | 8 to 12 mph | (7 to 10 knots) |
| Moderate | 13 to 18 mph | (11 to 16 knots) |
| Fresh | 19 to 24 mph | (17 to 21 knots) |
| Strong | 25 to 31 mph | (22 to 27 knots) |
| Near Gale | 32 to 38 mph | (28 to 33 knots) |

Wind warnings -

| | | |
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| Gale | 39 to 54 mph | (34 to 47 knots) |
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